COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

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August 31, 2004

IN REPLY PLEASE
REFER TO FILE: WM-4

TO: Each Supervisor

FROM: Donald L. Wolfe
Interim Director of Public Works

SACRAMENTO RIVER-SAN JOAQUIN RIVER DELTA LEVEE FAILURE
BOARD MOTION OF AUGUST 3, 2004, SYNOPSIS 8

On August 3, 2004, your Board approved a motion, Synopsis 8 (copy attached), by Supervisor Antonovich, instructing the Interim Director of Public Works to review the implications of the June 3, 2004, levee failure within the Sacramento River-San Joaquin River Delta on the reliability and safety of our water supply. Attached is our report.

Bay-Delta

California's two largest rivers, the Sacramento and San Joaquin, converge just southwest of Sacramento to form the Bay-Delta (Delta). The Delta is a complex environment that balances water from the San Francisco Bay with fresh water from the Rivers. The mix of fresh and salt water provides a unique environment that supports a diverse ecosystem of over 1,200 species of fish and wildlife. Water flowing through the Delta is the single most important source of water for agriculture, businesses, and the people of this State, providing water for almost two-thirds of all Californians. Los Angeles County, including our Waterworks Districts, relies on water from the Delta to meet a significant part of our communities' water needs.

Delta Levees

There are about 6,000 miles of levees in the Delta protecting farmland and creating 700 miles of meandering waterways providing the conveyance for water flowing through the Delta. Fifty-seven manmade islands are protected by these levees. These islands are generally far below sea level, and the waters that surround them, appearing more like depressions than islands. The levees are comprised of uncompacted soils and were built beginning in the 1850s without sound engineering, design, or construction methods. Many of these levees are privately owned and maintained. Their vulnerability to failure, especially during earthquakes or high storm runoff, has been a common concern for years.

Delta Levee Failure of June 3, 2004

On June 3, 2004, a significant breach occurred in a levee that protects the Delta Island known as the Jones Tract. The break, which grew to 400 feet wide and 20 feet deep, occurred to a privately owned levee that protected 12,000 acres of farmland. Water rushed in, flooding the farmland and forming an inland sea. It is unknown what caused the levee to break. The break dealt a devastating blow to the nearly 500 landowners and people who worked and farmed the area. It resulted in nearly $100 million in repair costs and losses to crops, equipment, and homes. It put in jeopardy the water supplies of 23 million urban water users as far south as San Diego and farmers in the Central Valley, along with Delta fish and wildlife. The collapse pulled a higher level of ocean saltwater into the Delta. For thee days, the pumps that bring water to Central Valley farmers and urban users in Southern California were shut down. Over 150,000 acre-feet of fresh water was released from upstream dams to counteract the seawater intrusion. A State and Federal disaster was declared, and crews working around the clock were able to close the breach. The long process to drain the island is underway and is not expected to be completed before mid-October.

Impacts of June 3 Levee Failure to Los Angeles County's Water Supply

Once underway, response efforts by Federal, State, and local agencies minimized any adverse impact to our water supply and quality. During this emergency, Metropolitan Water District officials stated that Southern California had sufficient water supplies south of the Delta in groundwater storage basins and State Project facilities such as Castaic Lake. Los Angeles County Waterworks Districts reported no major supply problems.

CALFED

The Delta is currently the subject of a State and Federal stakeholder effort, called CALFED, to develop a long-term, comprehensive plan to solve environmental and related water quality and supply problems. One of their resource management objectives is the protection of Delta levees with the goal to reduce risks associated with levee failures due to earthquakes, floods, and general deterioration. Today, nearly 50 percent of these levees lack compliance with Federal standards. Over the next 30 years, CALFED proposes to invest billions of dollars to improve its Delta conveyance system and levees. However, significant funding reductions have already severely delayed all aspects of the Levee Program, including efforts aimed at strengthening levees.

Impacts of Future Levee Failures to the Water Supply of Los Angeles County

The levee rupture of June 3 occurred in a remote region of the Delta under very normal conditions. It revealed an overlooked and often ignored vulnerability to the State's water supplies. A levee failure in a more critical area of the Delta or on a more massive scale could likely overwhelm the various agencies ability to respond and would have serious consequences on our economy and the quantity and quality of the water that comes to Southern California and Los Angeles County.

Conclusions and Implications

A complex array of Federal, State, and local agencies, with concern about liability and who would pay the bills, delayed the response of emergency workers, but did not impede emergency efforts, according to a recently concluded State Senate hearing. Better coordination among the various agencies is necessary to avoid this type of confusion in any future emergency response effort.

The current Delta Levee Plan has no long-term vision. For CALFED's through-Delta strategy to be successful, and to provide water quality and supply security to Southern California, it needs to develop a more farsighted and cohesive regulatory program and to reassess failure risks and prioritize where to place its limited resources. State Water Project leaders are asking CALFED to define a more comprehensive strategy that will address levee risks and their threat to the State's water supply.

There exist the potential for significant impacts, with unacceptably high risks, if massive levee failures were to occur. If such a failure were to occur in a major earthquake, it would likely overwhelm Federal, State, and local agencies' ability to quickly respond.

We hope this disaster has provided the wake-up call for CALFED and other officials to reexamine the Delta Levee Program. We will continue to monitor these and other important issues that impact our water supply and report to your Board as necessary.

AG:sv
P:\wmpub\Watershed Engineering\AL\deltaleveefailurevboardreport.doc

Attach.

cc: Chief Administrative Office
Executive Office

MINUTES OF THE BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

Violet Varona-Lukens, Executive Officer
Clerk of the Board of Supervisors
383 Kenneth Hahn Hall of Administration
Los Angeles, California 90012

Interim Director of Public Works

At its meeting held August 3, 2004, the Board took the following action:

8

Supervisor Antonovich made the following statement:

"On June 3, 2004, a major levee within the Sacramento - San Joaquin River Delta failed, forcing the evacuation of hundreds of people, flooding nearly 36 square miles of agricultural lands, with potential impacts to the drinking water for two-thirds of the State's residents, including those of us in Los Angeles County. This failure caused Governor Schwarzenegger to declare a State of Emergency, and State and Federal water officials began coordinating efforts to ensure protection of our water supply.

"The Delta is a significant source of our current and future imported water supply. We have heard past warnings from our State lawmakers and water officials about the fragile nature of the levee systems within the Delta and their importance as the hub of the State's water system. President Bush also recently declared it a Federal Disaster. We must recognize the importance of this source of water to our economic prosperity and the quality of life enjoyed by our citizens."

Therefore, on motion of Supervisor Antonovich, seconded by Supervisor Burke, unanimously carried (Supervisor Yaroslavsky being absent), the Interim Director of Public Works was directed to review implications of the June 3, 2004 levee failure within the Sacramento - San Joaquin River Delta on the reliability and safety to the water supply of the County's residents, and to report back to the Board within 30 days.

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Copies distributed:
Each Supervisor
Chief Administrative Officer
County Counsel

SACRAMENTO RIVER-SAN JOAQUIN RIVER DELTA LEVEE FAILURE OF JUNE 3, 2004

Bay-Delta

California's two largest rivers, the Sacramento and San Joaquin, converge just southwest of Sacramento to form the Bay-Delta (Delta), the largest estuary on the west coast of North and South America. The Delta is a highly dynamic and complex environment that mixes and balances water from the San Francisco Bay with fresh water from the Rivers. This mix of fresh and salt water also provides a unique environment that supports a diverse and productive ecosystem of over 1,200 species of fish and wildlife.

Water flowing through the Delta is the single most important source of water for agriculture, businesses, and the people of this State, providing water for almost two-thirds of all Californians, including the 10 million residents of Los Angeles County. Los Angeles County's Marina Water System and its Waterworks District No. 29, Malibu, are 100 percent dependent on imported water from the Metropolitan Water District (MWD), with most of it coming from the Delta through the State Water Project. Los Angeles County Waterworks District No. 36, Val Verde, relies on State Project water, imported from the Delta by the Castaic Lake Water Agency (CLWA), for 100 percent of its supply. Los Angeles County Waterworks District No. 40, Antelope Valley, and Los Angeles County Waterworks District No. 37, Acton, rely on State Project water, imported from the Delta by Antelope Valley-East Kern Water Agency (AVEK), for about two-thirds of its supply.

Delta Levees

There are about 6,000 miles of levees in the Delta protecting farmland and creating 700 miles of meandering waterways. Fifty-seven manmade islands are protected by these levees. These islands are generally 10 to 20 feet below sea level and the waters that surround them, appearing more like depressions than islands. The levees are comprised of uncompacted silts and sands and were built beginning in the 1850s without sound engineering, design, or construction methods. Today, many of these levees that protect the agricultural lands are privately owned and maintained. As subsidence of these islands continue, due to oxidation of the rich peat soils during farming activities, the levees themselves must be regularly maintained and periodically raised and strengthened. As the State's water supplies developed, these levees also formed the conduit for water flowing through the Delta.

While the Delta levee system provides a wide array of benefits, many of the levees do not provide a level of flood control protection in line with the value of beneficial uses

they protect. The vulnerability of the levees to failure, especially during earthquakes or high storm runoff, has been a common concern. This concern was recognized by the State, as far back as the 1950s, when planning was underway for the State Water Project. Guidelines established by the State and the Army Corps of Engineers set requirements by which the levees are to be maintained. However, maintenance of the private levees is dependent on private resources of the landowner or reclamation districts, and there is no State or Federal program that routinely inspects the levees.

Importance to Southern California

The Delta is the hub of California's water supply distribution system. It is the heart of the north-to-south delivery system whose levees form the arterials to transport water through the Delta for export to agricultural users in the Central Valley and urban users in Southern California. Maintaining a viable and healthy Delta means better drinking water quality and a more secure water supply for Southern California and the residents of Los Angeles County. Endangered aquatic species have resulted in State and Federal restrictions that make it increasingly difficult to export water from the Delta, particularly during droughts. A more reliable supply is achieved when constraints are no longer placed on the exports of water. Improved water quality occurs with a reduction of the release of pollutants into the system, giving cleaner water and helping communities better manage their water treatment costs.

Delta Levee System Vulnerability

For many years, there has been a concern that the levees were vulnerable to failure during earthquakes and periods of high runoff. The failure of these levees could cause seawater from the San Francisco Bay to be drawn into the Delta, flooding farmlands, impacting wildlife habitat, and disrupting water supply deliveries to urban and agricultural users. Assessment by agencies such as the United States Geological Survey concluded there is a high probability of a large magnitude earthquake in the area within the next 30 years.

CALFED

Currently, the Delta is the subject of a collaborative effort among 23 State and Federal stakeholders, called CALFED, to develop and implement a long-term, comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Delta. In August 2000, CALFED's Record of Decision was signed that defined a balanced, comprehensive approach to reduce conflicts over water supplies and to address the State's water needs. One of the four basic resource management objectives is the protection and integrity of Delta levees. One of the goals of the Levee System Integrity Program was to reduce risks associated with the sudden and catastrophic failure of Delta levees, due to earthquakes, floods, and general deterioration, by implementing an integrated and comprehensive rehabilitation and maintenance program.

Levee System Integrity Program

To achieve the goals of the Levee System Integrity Program and other CALFED objectives, it was determined that the levees were to remain in their current configuration. The Program identifies several objectives to restore the integrity of the levee system. This includes (1) establishing uniform guidelines/requirements for levee maintenance, (2) enhancing flood protection through improved levee stability, (3) creating priority buffer zones to protect critical islands, and (4) developing an emergency management plan to respond to Delta flood events or levee failures. The Program consists of actions or projects that are to be implemented, in phases, over 20 to 30 years.

Prior to CALFED, maintenance objectives and funding mechanisms were established by Federal legislation in 1973. Since then, Federal, along with State and local funding, has resulted in over $160 million in improvements to Delta levees. These efforts were intended to bring levees up to standard levels of protection. However, as of 1998, only 58 percent of the levees were in compliance with Federal standards. Over the next 30 years, CALFED proposes to invest billions of dollars in the Delta. To protect this investment, CALFED has also chosen to protect Delta levees to a higher standard than that required today. CALFED's seven-year Stage 1 Program anticipates spending nearly $500 million on its Delta Levee Program. In its first two years, it has invested a little over $50 million. However, significant funding reductions have severely delayed all aspects of the Levee Program, including those efforts aimed at strengthening the levees. While all aspects of the CALFED program have suffered from lack of funding, the Levee Program has probably suffered the greatest from lack of funding.

Delta Levee Failure of June 3, 2004

On June 3, 2004, a significant breach occurred in a levee, 20 miles west of Stockton, that protects the Delta island known as the Upper and Lower Jones Tract. The break, which grew to 400 feet wide and 20 feet deep, occurred to a privately owned levee that protected 12,000 acres of farmland used to grow alfalfa, corn, and other crops. Instead of fresh water flowing towards the ocean, the break caused the fresh water from the River to flow towards the lower elevations of the islands pulling more seawater inland and flooding the islands. It is unknown what caused the levee to break.

Confusion over responsibilities led to some delays in responding to this emergency. The Department of Water Resources assumed lead responsibilities because of the threats to State roads and the water supply. Water officials immediately began coordinating efforts to monitor and ensure protection of our water supplies. Water exports from the Delta were cut off, and over 150,000 acre-feet of fresh water was released from upstream dams to counteract the intrusion of seawater. Three days after the break, water exports were resumed at a reduced rate. A major disaster declaration

was declared by both Governor Schwarzenegger and President Bush, making State and Federal funds available to assist local governments and reclamation districts in emergency repairs and restoration.

The levee break put additional pressure on adjacent levees. Crews, working around the clock, were able to prevent further breaks. The break in the levee was closed on June 30, and in mid-July, pumping began to drain flooded farmland. Draining of the farmland is not expected to be completed before mid-October, and it is expected to be much later before farming activities can be reestablished. Until dewatering is completed, there is still concern for the stability of the surrounding islands. The break dealt a devastating blow to the nearly 500 landowners and people who worked and farmed the area. It resulted in $100 million in repair costs and losses of crops, equipment, and homes. In addition, it affected the water supplies of 23 million urban water users as far south as San Diego, farmers in the Central Valley, and Delta fish and wildlife. State officials have said that had this occurred during the winter months, with the possibility of storms and flood conditions, repairs would have taken much longer and damage would have likely been much greater.

Impacts of June 3 Levee Failure to Los Angeles County's Water Supply

Coordinated and speedy efforts between State and Federal officials and among the water community minimized any adverse impacts to our water supply and water quality. Water quality degradation, however, was noted within the Delta and, more recently, some odor issues associated with drinking water supply affected some local water supplies around the Lodi area. At the time of the break, the pumps bringing water to Southern California were down for maintenance, so no water quality impacts were noted at the point of water deliveries to Southern California. During this emergency, MWD officials stated that Southern California had sufficient water supplies south of the Delta in groundwater storage basins and State Project facilities such as Castaic Lake. CLWA and AVEK also reported no significant impacts and were able to meet the water demands of our County Waterworks Districts.

Potential Impacts of Future Levee Failures

There exist the potential for significant impacts, with unacceptably high risks, if massive levee failures were to occur. This could result in loss of infrastructure, land use, damage to the ecosystem, reduced water supply reliability, and reduced water quality in the Delta. Water supply operations would be impacted by loss of infrastructure used to transport water to urban and agricultural users south of the Delta. Degraded Delta water, from seawater intrusion, would impact the water quality of urban users throughout the State. Loss of agricultural land use and long-term productivity would occur. Habitat for terrestrial species would be significantly impacted by inundation of Delta islands. Seawater intrusion would significantly impact fresh water aquatic life. The cost to our economy in terms of economic activity, infrastructure loss, repairs, and rebuilding efforts could reach billions of dollars.

Impacts of Future Levee Failures to the Water Supply of Los Angeles County

The levee rupture of June 3 occurred in a remote region of the Delta under very normal conditions. Although it had a severe impact on the economy, it did not seriously impact water users outside the Delta. However, it did reveal an overlooked and often ignored vulnerability to the water supplies in the Central Valley and Southern California.

A levee failure in a more critical area of the Delta or on a more massive scale, similar to that occurring in an earthquake, would have serious consequences on the supply and quality of the water that comes to Southern California and Los Angeles County. It would disrupt our water supply deliveries and interrupt the transportation and regional flow of goods, impacting our economy. Even if infrastructure delivery systems were to survive, long-term or permanent inundation of islands would significantly impact the quality of water delivered to Southern California. This would be particularly acute if this were to occur during dry years. Under these conditions, seawater would intrude further into the Delta, impacting water quality and interrupting water supply deliveries until the saltwater could be flushed from the Delta. For this to occur, flushing flows released from upstream reservoirs would be required. This could deplete the water supplies in these reservoirs and diminish their ability to respond to other demands. MWD has a six-month emergency supply available in our region, which they deem adequate based on past levee failures. CLWA, with plans under development, will have adequate supplies to satisfy current demands for nearly a year. AVEK has no emergency supplies and would have to rely on State Project water it has stored south of the Delta. Despite these agencies' best efforts in planning for emergencies such as droughts and other disasters, it is difficult to conclude that our water supply system would not be highly vulnerable and economy would not be severely impacted or stressed by such major levee failures.

Conclusions and Implications

A complex array of Federal, State, and local agencies, and concern about legal liability and who would pay the bills, delayed the response of emergency workers, but did not impede the flood containment efforts according to a recently concluded State Senate hearing. Agencies did not seem to understand or know their responsibilities or authority. Decisions were delayed as agencies tried to figure out who would pay for the response, and the Federal government failed to get involved because the levee was privately maintained and not Federally regulated. The Reclamation District established to maintain the levee, within hours of the break, exhausted their annual maintenance budget, jeopardizing the ability to immediately hire contractors. Even today, the issues of responsibility are still unresolved. Better coordination among the various agencies is necessary to avoid this type of confusion in any future emergency response effort.

The Federal government needs to do more to provide their share of CALFED funding. While the State has been better in providing its share, it still falls significantly short in

funding the kind of levee repairs necessary to provide long-term security. In fact, just this year, money was diverted from flood protection as part of the State's midterm budget adjustments. While environmental restoration efforts have received priorities in early CALFED spending, it is important as we move forward to achieve a better balance in spending on water supply reliability efforts.

In 1944, the idea of a conduit around or through the Delta was first proposed. This foreshadowed later plans, for what has been called the Peripheral Canal, that would bring water to Southern California without passing through the Delta. In 1977, this formally became part of the Department of Water Resources State Water Plan. In part, this was proposed over concern of the stability of Delta levees. However, in 1982, a Statewide referendum on this issue prevented its construction. As recently as 1998, when CALFED unveiled its comprehensive plan to solve environmental and water supply problems and outlined its three alternatives, many felt that its proposal for a new channel to bypass the Delta had the greatest potential to resolve Delta problems and provide better water quality and supply reliability. Environmental and political concerns prevented that alternative from becoming the recommended plan, and its through-Delta alternative, that proposed to modify the existing channel system, was selected.

For CALFED's through-Delta strategy to be successful, and to provide water supply benefits to Southern California, it needs to better define its levee improvement plan to refocus on the serious issue of water supply reliability in addition to its current plan of protecting the ecosystem of the Delta. The current plan focuses primarily on in-Delta issues and not on water supply reliability of water exported from the Delta. The current Delta plan has no meaningful long-term vision and needs to reassess its business as usual approach. It needs to reassess failure risks and where to spend limited resources to assure water supply reliability. The State may also need to reassess the need to develop a backup plan, such as a dual conveyance facility, as a reminder to the unacceptable risks of massive levee failures.

Water officials hope that this levee failure will provide a wake-up call for CALFED and the State to reexamine their Delta levee program and develop a more farsighted and cohesive regulatory program to make this a sustainable Delta. State Project contractors are urging the development of a more comprehensive Delta strategy that will address risks associated with the Delta levees and to further develop an emergency preparedness and response plan. They hope to work with CALFED State, and Federal officials to address both near and long-term levee planning with the hope of developing a more effective strategy that will protect the State's water supply.

In all probability, any major levee failure, such as likely to occur in a major earthquake, would likely overwhelm the Federal, State, and local agencies' ability to quickly respond. Water agencies appear to base their ability to respond to future levee failures on historical outages. However, these historical counterparts do not seem to be predicated on a sense of what might be the response capabilities resulting from more broad-based damages, expected community wide, in a major earthquake.

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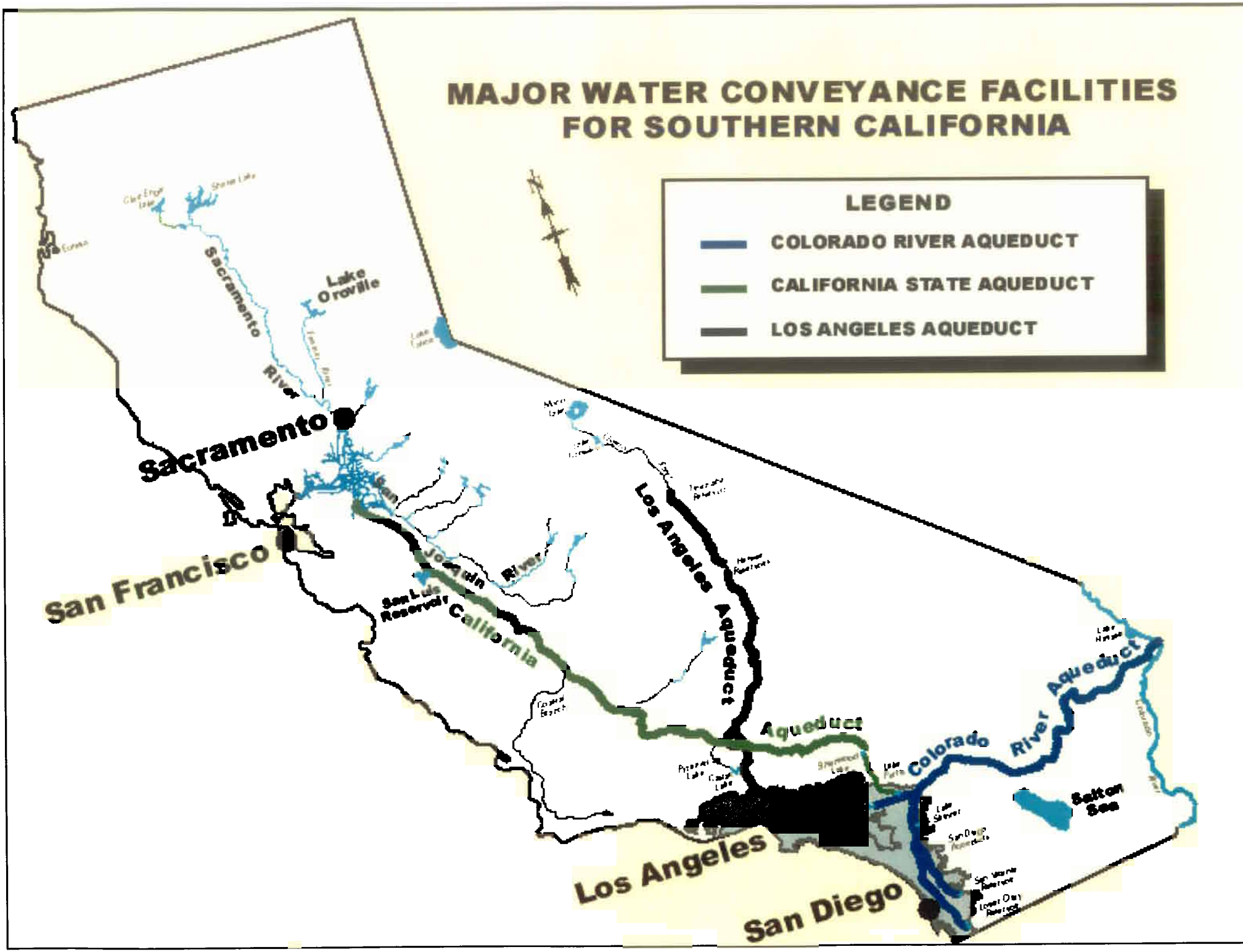
Sacramento/San Joaquin
Delta Levee Break


MAJOR WATER CONVEYANCE FACILITIES
FOR SOUTHERN CALIFORNIA
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LOS ANGELES AQUEDUCT
Sacramento River
Lake Oroville
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San Francisco
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San Luis Reservoir
California Aqueduct
Los Angeles Aqueduct
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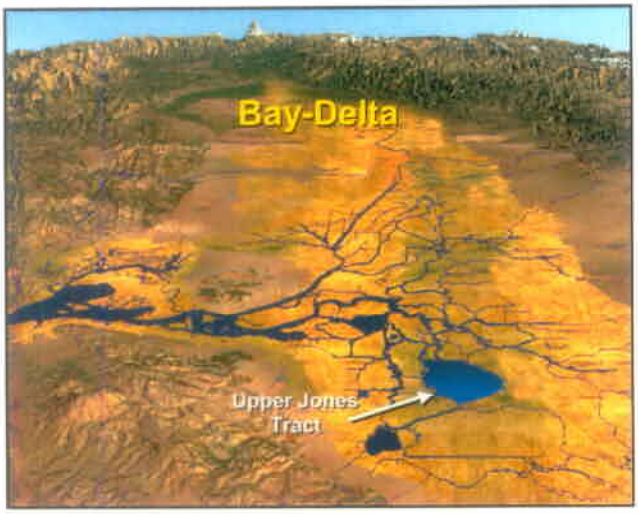
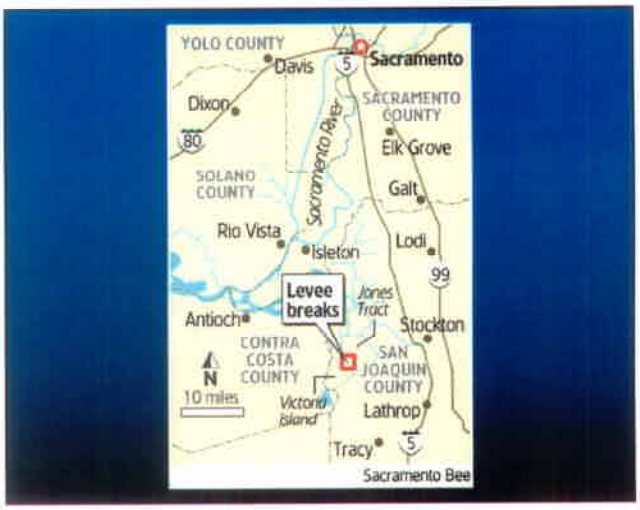

Bay-Delta
Upper Jones Tract


Upper Jones Tract
Levee Break


YOLO COUNTY
Davis
Sacramento
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Dixon
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SACRAMENTO COUNTY
Elk Grove
Sacramento River
SOLANO COUNTY
Galt
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Lodi
99
Levee breaks
Jones Tract
Antioch
Stockton
CONTRA COSTA COUNTY
SAN JOAQUIN COUNTY
N
10 miles
Victoria Island
Lathrop
Tracy
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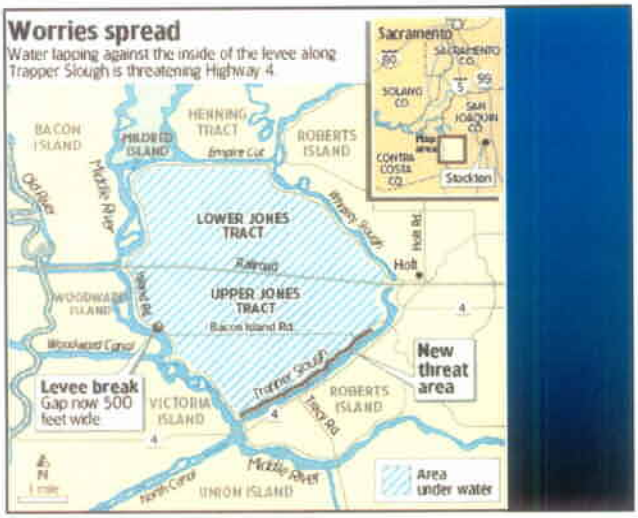
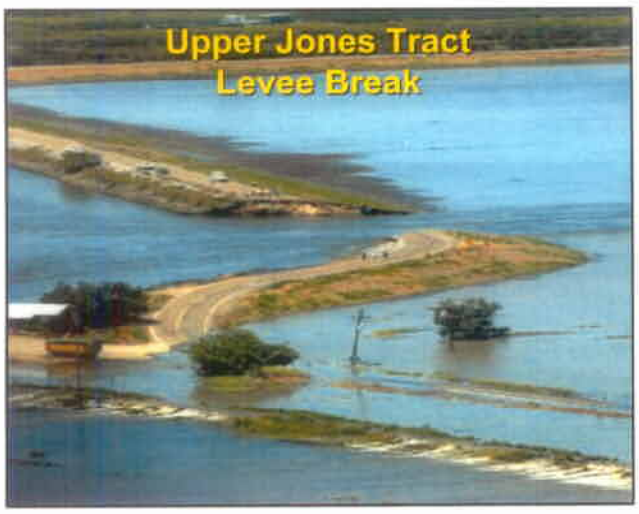
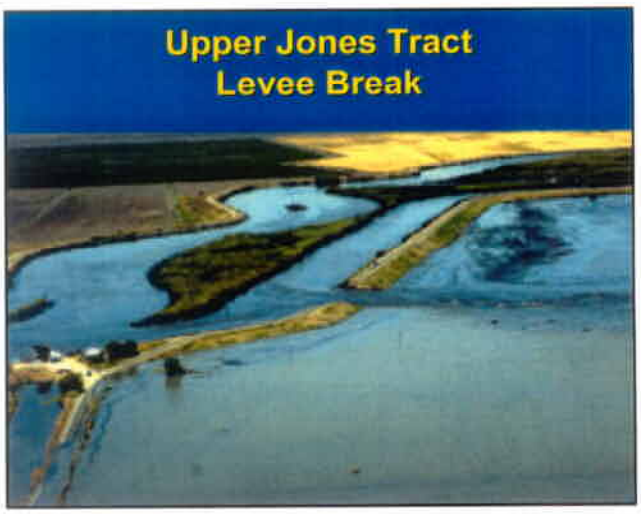
Sacramento Bee


Worries spread
Water lapping against the inside of the levee along Trapper Slough is threatening Highway 4
Sacramento
SACRAMENTO CO.
SOLANO CO.
SAN JOAQUIN CO.
CONTRA COSTA CO.
Stockton
BACON ISLAND
MILDRED ISLAND
HENNING TRACT
Empire Cut
ROBERTS ISLAND
Old River
Middle River
LOWER JONES TRACT
Railroad
Holt Rd.
Holt
WOODWARD ISLAND
Bacon Island Rd.
UPPER JONES TRACT
Woodward Canal
New threat area
Levee break
Gap now 500 feet wide
VICTORIA ISLAND
Trapper Slough
Tracy Rd.
ROBERTS ISLAND
Middle River
North Canal
UNION ISLAND
Area under water

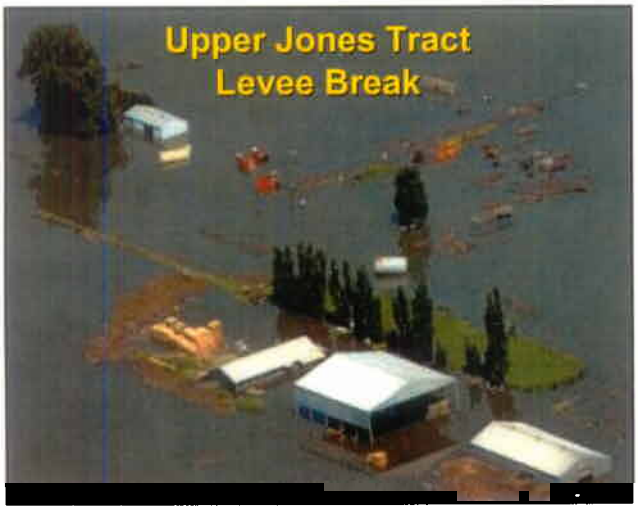

Upper Jones Tract
Levee Break


Upper Jones Tract
Levee Break


Upper Jones Tract
Levee Break


Upper Jones Tract
Levee Break


Upper Jones Tract
Levee Break


Upper Jones Tract
Levee Break


Sacramento/San Joaquin
Delta Levee Break